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An Air Management Strategy for Williams Lake

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AN AIR MANAGEMENT STRATEGY

FOR

WILLIAMS LAKE

by

R. G. Wilson

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PREFACE

In June 1987, the Honourable Bruce Strachan, Minister of Environment and Parks, initiated an investigation of various alternatives for controlling emissions from the eight woodwaste burners in Williams Lake. The purpose of this investigation was to address those control measures which could produce an acceptable air quality in the city, while focussing on opportunities to reduce the number of burners and the quantity of wood burned.

This report provides an overview of the investigation conducted by the Ministry, and specifically focusses on potential solutions and related policy issues. A second report, entitled "Woodwaste Incineration and Air Quality in Williams Lake" by Dr. K.K. Bhattacharyya, provides a more detailed engineering perspective.

R. G. Wilson
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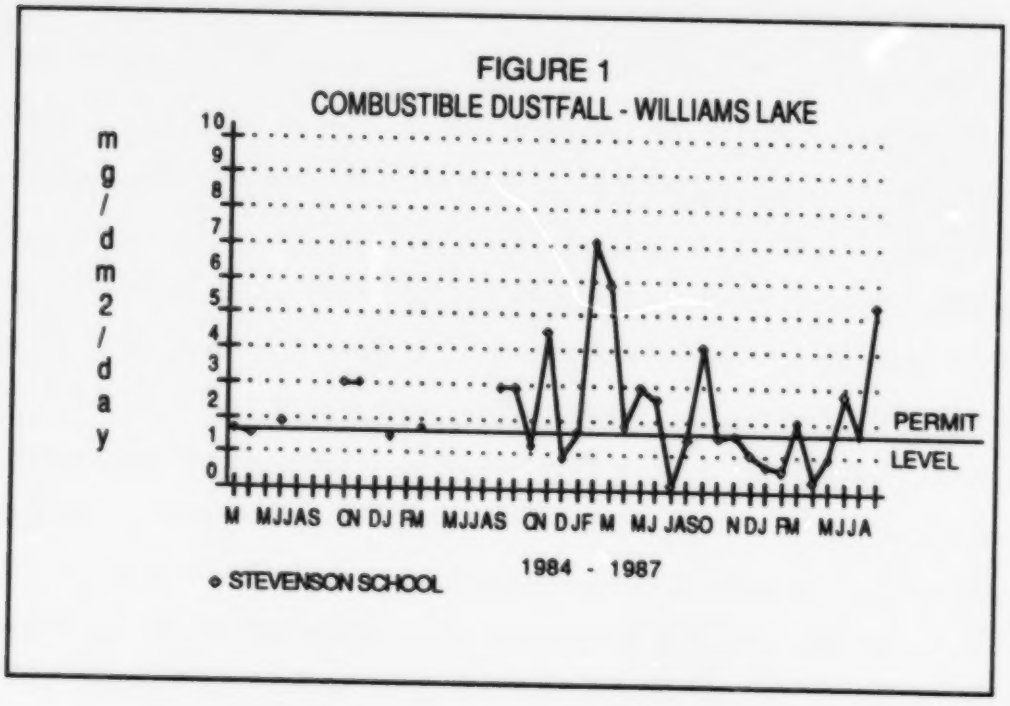
1. AIR QUALITY

The air quality in Williams Lake does not meet Provincial objectives, and available monitoring data indicate that there has been a deterioration within the last few years. Dustfall has been measured for several years at various locations in the city and, as illustrated in Figure 1, the acceptable levels stipulated on the sawmills' Waste Management Permits are regularly exceeded.



Additional air quality monitoring, specifically intended to identify any health impacts, was initiated in Williams Lake in the spring of 1987. This monitoring program is being conducted at the Anne Stevenson School and at the Fire Hall, and includes the parameters known as total suspended particulates, inhalable particulates and polycyclic aromatic

hydrocarbons. The intention is to concentrate this monitoring on the smokiest days experienced in the city. Unfortunately only a few days have been sampled to date, making it impossible to come to any firm conclusions.

2. REGULATION OF WOODWASTE DISPOSAL

Within British Columbia, approximately 180 woodwaste burners operate under the Pollution Control Objectives for the Forest Products Industry (1977). Waste Management Permits stipulate emission objectives for smoke opacity (or burner temperature), and often include an ambient air quality objective for dustfall.

The "teepee" or "wigwam" burner has been used for many years to dispose of woodwastes from sawmill operations. However it is very difficult to maintain satisfactory emissions from such burners, and in many jurisdictions they have either been phased out or have come under strict control. In Oregon, for example, a wigwam burner is not allowed to operate within 4.8 kilometres of a population centre of 4,000 or more. In the State of Washington, best available control technology can be required for environmentally sensitive areas.

Technological solutions are available to control emissions from wood burning but, because of the cost, it is most practical to consider such devices for very large installations or where the costs can be offset by income generated through the use or sale of energy.

Clearly it is good sense from both environmental and economic viewpoints to pursue any solution which produces another product which can be used or sold for a profit, rather than dispose of a waste at a cost. In this regard, it should be noted that two of the Williams Lake sawmills utilize a portion of their total woodwaste (Lignum uses about 16%, and Weldwood about 53%), but this represents only 14% of the total woodwaste generated in the city (here assumed to be 2.5 million cubic metres bone dry volume per year). It is also noteworthy that Williams Lake does not have a pulpmill or other large user of woodwaste as do many other communities in the Province.

3. CONTROL OPTIONS

It is evident that it is not possible to maintain an acceptable air quality in Williams Lake while all of the existing burners continue to operate, even if a repair and maintenance program was instituted as necessary. In order to maintain an acceptable environmental quality, the following options should be considered:

(a) Reduction in number of burners

Setting high standards for any woodwaste burners which continue to operate in the city, depending on the nature of the standard, could have the effect of: (1) eliminating some of the existing burners which lack the essential features of a modified woodwaste burner, or (2) eliminating all of the existing burners in favour of one or more new burners equipped with modern emission controls. In both cases, the sawmills would need to act co-operatively (sharing access to

remaining burners), and total costs of disposing of the woodwaste would increase without any economic benefit.

The sawmills (Burner Committee) conducted a study in 1985 for centralized burning in large wigwam burners, and concluded that the capital cost would be about $5.6 million, with an annual operating cost of $3.3 million. While this particular solution could improve the city's air quality for a short time, it is a very expensive long-term option without any economic return.

The option of eliminating some of the burners could be considered as a short-term measure. Some of the better burners are not used 24 hours a day, and hence there is spare capacity. Emissions would be reduced both because of the reduction in the number of burners and because there would be fewer start-up and shut-down cycles in the remaining burners. Costs could either be borne collectively by the industry or by those individual mills whose burners would be eliminated.

(b) Increased utilization in the sawmills

Both natural gas and electricity are being used for energy in the mills, including heat for the lumber dry kilns. Two of the mills currently use woodwaste to supply part of their energy needs, and Section 8(1)(f) of the Waste Management Act could be used to require all of the mills to recover thermal energy and thereby reduce the amount of wood incinerated.

(c) Generation of electricity

There have been several studies during the past ten years concerned with the potential of generating electricity from woodwaste in British Columbia. During our investigation, we have reviewed previous studies, obtained our own estimates of costs independently, and visited thermal power installations in other jurisdictions. It is clear that this option should be considered very closely for Williams Lake because it represents an environmentally acceptable solution based on proven technology which has the potential to provide an economic return.

While several studies of generating electricity from woodwaste have been conducted, the existing policies of the British Columbia Hydro and Power Authority do not encourage the construction of such facilities. Such is not the case in some other jurisdictions, especially where energy prices are higher and where electrical utilities have policies that favour the purchase of electricity at a price that reflects the cost to the utility if it were to develop its next available source of energy. Such situations have existed in Scandinavia and in the United States for some time, and small generation facilities are now being constructed in Ontario.

The environmental benefit of such facilities is obvious: several small and inefficient combustion sources with no emission controls are replaced by a single efficient source equipped with emission controls. At one steam and electricity plant in Eugene, Oregon, the estimated particulate emissions are only 4% of those from the 25 woodwaste burners it replaced.

In Kettle Falls, Washington, a 42 megawatt powerplant, built by the Western Washington Water Power Co. in 1983, consumes woodwaste collected within a radius of 100 miles and meets environmental standards.

The estimated 2.1 million cubic metres of woodwaste that is incinerated annually in Williams Lake could produce 60 megawatts of electricity. Available cost estimates for a plant of this size range from $72 million to $105 million, and the required selling price for the electricity appears to be in the range of 3.3 to 4.3 cents per kilowatt hour, depending on the cost of borrowed capital, the rate of return, and other assumptions.

The costs of a 36 megawatt plant (suitable to support five of the Williams Lake mills) were obtained as part of the Ministry's investigation, as a means of comparing costs for a smaller plant. It was estimated that this plant , with 60% of the generating capacity, would have a capital cost of about 75% of the larger plant, and would require a selling price of about 1/2 cent (15%) higher.

(d) Wood densification

Densification of woodwaste into pellets and carbon appears to be technologically and economically feasible. Wood pellets are being manufactured in other areas of Canada and the United States, and a pellet plant is proposed to be constructed in Delta. The major difficulty

with locating a pellet plant in Williams Lake appears to be the cost of transporting the product to market.

In November 1987, M.J. Henrickson and Associates, and the K-Carbon Group, announced that a carbon plant would be built in Williams Lake. This plant would consume about 7% of the woodwaste, but was initially intended to use only white wood (ie. no bark would be used). Subsequently, the developers recognized that this could adversely affect the local air quality, and applied for government assistance to build a demonstration plant that would utilize both white wood and bark.

Both of these options offer interesting alternative uses for woodwaste with apparently good economic returns.

4. RECOMMENDATIONS

(a) Long Term

Electricity production from woodwaste should be pursued vigorously as a means of reducing particulate emissions in Williams Lake. This option has considerable potential for success if the existing electricity purchase policies of British Columbia Hydro and Power Authority can be appropriately modified. In the associated economic evaluation of this option, the sawmills' current costs for maintaining and operating the existing burners should not be overlooked, nor should the indirect costs of the existing unsatisfactory environmental impact.

The development of other technologies for creating new products, such as pellets and carbon, should be encouraged to diversify the options for better utilization of woodwaste.

In the medium-to-long term, the loading of particulates on the airshed must be reduced significantly to meet air quality objectives. Implementation of the technologies discussed above would allow these objectives to be attained while, at the same time, achieving an economic return for the woodwaste. If these technological solutions are not implemented soon, the Ministry of Environment and Parks should consider implementing woodwaste burner policies such as those developed by the states of Washington and Oregon.

(b) Short Term

In the short term, the Ministry of Environment and Parks should ensure that all woodwaste burners in Williams Lake strictly meet the construction standards for woodwaste burners authorized by the Pollution Control Objectives. Any Permit holder unable to satisfy construction or monitoring requirements may have his Permit suspended.

(c) Monitoring

The special air quality monitors should be placed onto an automatic cycle to obtain a satisfactory amount of data on current conditions within the next six months. Consistent with Ministry practice in other similar situations, the industry should be expected to pay for a major part of the ongoing monitoring program throughout the City.